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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,050	08/10/2006	Yoshinori Ohmuro	1503.75706	5473

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EXAMINER	
BRUTUS, JOEL F	
ART UNIT	PAPER NUMBER
3768	
MAIL DATE	DELIVERY MODE
02/06/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/589,050	OHMURO ET AL.	
	Examiner	Art Unit	
	JOEL F. BRUTUS	3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :4/3/2008, 11/19/2007 and 8/10/2006.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Codazzi (US Pat: 5,275,040) in view of Lowell et al (US Pat: 5,228,347) and/or Akiyama (US Pat: 4,557,148).

Regarding claims 1-23, Codazzi teaches an ultrasonic flow meter [see column 1 lines 65-66] that uses pulse Doppler method using Doppler shit and power spectrum [see column 21 lines 40-60] and transit time method [see abstract] that is pertinent to the claimed invention. Codazzi further teaches an annulus transducer and standpipe transducer is disposed at the surface. The drill string signal from standpipe transducer and the annulus signal from annulus transducer are applied to "Delta Arrival Time Analyzer" via two leads. The drill string and annulus signals are also applied to a standing wave analyzer and to a total transit time analyzer. The total transit time analyzer generates a total transit time 2T(t) representing the transit time down the drill string and up the annulus determined from the pump beatings. In a preferred

embodiment of the present invention, the total transit time analyzer is used when two or more pumps are operating at roughly the same flowrate. An alarm FI_3 is generated when an exponential increase in 2T(t) is determined. In the case where only one pump is used, then 2dT/dt, the rate of change versus time of the total transit time down the drill string and up the annulus, is used instead of the total transit time 2T itself. An alarm $_{is}$ generated on lead when 2dT/dt is larger than a predetermined threshold, for example, 12 milliseconds per minute. The "Kick" or Fluid Influx Analyzer responds to the FI_1 signal to the FI_2 signals, and to the FI_3 signal (if one or more mud pumps are used as described below) to issue an alarm fluid influx signal FI on lead for activating an alarm at the driller's control station of the drilling rig 5. These signals may be used to provide real time information to the driller concerning a gas influx by means of a CRT display, a printer, plotter or the like positioned at a location convenient to the driller. Computer program [see fig 12], computer memory [see column 20 lines 18-22].

Each time domain signal is applied respectively to a Fast Fourier Transform modules to convert it to a frequency spectrum on the leads. Multiplication by the frequency response curve of band pass filters and Inverse Fast Fourier Transform modules 68, 70 convert the drill string and annulus signals to time domain signals. The amplitudes of these time domain signals vary with the downhole information used to modulate the carrier pulse train. Fast Fourier Transform modules [see figs1-6, column 17 lines 19-60]. The output of FFT modules are frequency spectra $S(\omega)$ and $A(\omega)$, the spectra for the drill string and the annulus signals as previously processed [see column lines]. After the conversion to digital form by A/D converters, the standpipe signal S(t)

and the annulus signal a(t) are Fourier transformed in FFT modules to produce respectively the spectra S(ω) and A(ω). The next step is to determine the cross spectrum and the coherence Gamma. Coherence is an indication of the statistical validity of the cross spectrum measurement. The next step is to calculate the phase of the cross spectrum as a function of frequency. This phase φ(ω) is calculated as the inverse tangent of the ratio of the imaginary part to the real part of the cross spectrum [see figs 1-7, column 17 lines 19-60].

The consistency check uses the mud flow rate and the annulus cross section area. The mud return velocity is determined and compared and comparing this to a predetermined ratio. A weighted average is preferred, the weights being the signal strength and the coherence at the considered frequency. the logic box provides access to stored phase curves which are determined and the integer "JUMP" is incremented (or decremented) each time the difference between two consecutive values of the phase (determined from one calculation loop to the next), exceeds a level called UNWRAP THRESHOLD [see column 17, lines 19-60]. The choice between incrementing or decrementing JUMP loop depends on the sign of such difference of phase calculated between calculation loops [see column 17 lines 19-60].

Codazzi doesn't teach selecting a method when measurement is smaller than first, second, third and fourth predetermined threshold; comparing values of two methods and select the one with larger values.

However, Akiyama teaches an ultrasonic flow meter comprising a signal generator for supplying a synchronizing signal to an ultrasonic propagation path and

frequency division time signal to a flow rate computing unit [see abstract]. Akiyama further teaches establishing a threshold in advance for reception time signal [see column 9 lines 10-20]; measurement mode for measuring flow rate of a fluid based on a reference value established by a first self learning capability [see column 9 lines 54-60]; sequential approximating means [see column 8 lines 28-31]; time difference detector, a counter, comparator, control circuit [see fig 9]. The ultrasonic flow meter includes an abnormal signal detector [see column 8 lines 45-49]; a comparator that compares a reception signal and predetermined level signal and it used to indicate the operation of a first learning capability [see column 10 lines 49-56]; predetermined level signal generator, statistical processor [see column 10 lines 54-57]; confirming through control circuit whether waveforms have been counted given number of times for predetermined level signals, count array means [see column 10 lines 54-65].

However, Lowell et al teaches an ultrasonic flow rate meter capable of measuring a flow rate by a pulse Doppler method and a transit time method simultaneously in parallel by comprising: at least one pair of electric/ultrasonic transducers necessary for measuring a flow rate by a transit time method (col. 3,lines 12-26); a hardware unit for providing at least one pair of electric/ultrasonic transducers with a pulse signal necessary for measuring a flow rate by the pulse Doppler method and necessary for measuring a flow rate by the transit time method (fig. 1); a detection circuit for detecting a Doppler frequency shift from a received signal obtained from a discretionary transducer including the one pair of electric/ultrasonic transducers [see col. 3, lines 19-26 and col. 6, lines 50-64]; a conversion circuit for amplifying and analog/digital-

converting a first received signal obtained by an ultrasonic pulse transmission from the upstream to the downstream, and a second received signal obtained by an ultrasonic pulse transmission from the downstream to the upstream, both by the one pair of electric/ultrasonic transducers; and a control unit for calculating a flow rate from the detected Doppler frequency shift by the pulse Doppler method and also a flow rate from the output of the conversion circuit by the transit time method fig 5B).

Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to combine these references; for the purpose of detecting flow rate/velocity with great accuracy. Comparing predetermined values would allow one with ordinary skill in the art to evaluate and to modify the diagnostic procedure. Using a computer readable medium would provide an artisan with the capability of having the procedure on a removable medium to be used at a later time or at another location.

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL F. BRUTUS whose telephone number is (571)270-3847. The examiner can normally be reached on Mon-Fri 7:30 AM to 5:00 PM (Off alternative Fri).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571)272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. F. B./
Examiner, Art Unit 3768

/Long V Le/
Supervisory Patent Examiner, Art Unit 3768